GOVERNMENT OF INDIA.

REVENUE AND AGRICULTURAL DEPARTMENT.

WEATHER SUMMARY FOR MAY 1889.

Simla, the 26th June 1889.

General Weather conditions of the month.—The chief feature of the month is the increase of temperature which proceeds more rapidly in Upper than in Central India. The hottest area during the early part of the month usually includes the Central Provinces, Central India, and the eastern districts of the North-Western Provinces. It is usually transferred to Rajputana and Sind in the third or fourth week of the month. The continued high temperature in Central and Upper India usually diminishes pressure rapidly during the month in those areas and establishes the baric gradients necessary for the extension of the south-east trades winds across the equator and their continuance northwards as the south-west monsoon winds into India.

Usually one or two feeble advances of these humid winds occur during May which give moderate rain to Ceylon, Malabar, and to Tenasserim. The great advance however does not usually take place until the end of May or the beginning of June. This forms what is known as the setting in of the south-west monsoon. Over the whole of Central and Northern India the weather is generally very hot and dry, but hot weather storms occasionally occur and sometimes give very heavy showers, more especially in Bengal and Assam, and in and near the hills in Behar and the North-West Provinces. In Bengal and Assam the amount of rain received from the local thunderstorms is sometimes very considerable, and the showery weather of May occasionally merges at the end of the month almost imperceptibly into the rain of the south-west monsoon.

Temperature.—The past month has been characterized by higher average temperature than usual in all districts except the Punjab and Assam.

The following give the mean temperature data for the various Provinces :

Provinces.	Mean Maximum Temperature May.	Variation from Normal.	Mean Minimum Temperature May.	Variation from Normal	Mean Daily Temperature May.	Variation from Normal.
	°		°		°	
Burmah	97·4	+4·4	78·2	+2·6	87·8	+3·5
Bengal	98·9	+3·5	79·3	+2·7	89·1	+3·1
Assam	85·4	—1·2	72·1	—0·1	78·8	—0·6
North-Western Provinces ..	105·8	+1·8	77·7	+0·1	91·8	+1·0
Punjab	100·6	—1·6	72·2	—0·5	86·4	—1·1
Sind and Rajputana	104·1	+0·1	78·9	+1·5	91·5	+0·8
Central India	105·9	+0·8	76·6	—0·3	91·3	+0·3
Central Provinces	107·5	+1·3	80·9	+0·9	94·2	+1·1
Bombay	96·2	+2·3	77·7	+1·0	87·0	+1·7
Madras	99·8	+0·8	80·3	+1·5	90·1	+1·2

This table shows that the excess of temperature was greatest for Burmah and Bengal.

Temperature was considerably above the average at the commencement of the month. The 3rd and 4th were very hot days in Bengal and Burmah, and at many stations the maximum day temperature was from 8° to 12° above the normal.

Dry hot weather with excessive temperature continued steadily until the 20th. The 10th and 11th were very hot days in North-East India. The mean maximum temperature averaged 7° above the normal in Bengal and the North-West Provinces, 5° in Burmah, and 4° in the Central Provinces. The hottest area at this time was the eastern districts of the Central Provinces and the adjacent districts of Bengal. The hottest area was transferred to the eastern districts of the North-West Provinces and Central India on the 18th and 19th, on which days very high temperatures were recorded at Allahabad and other stations in these areas. A very rapid reduction of temperature took place on the 22nd in consequence of showers over the greater part of Northern and Central India. In many cases the day temperature was reduced from 20° to 30°. Thus on the 23rd the maximum temperature was 18° below the normal at Sutna, 15° below it at Patna, and 14° at Allahabad. On the 25th it was 22° below it at Ludhiana, 19° at Sialkote, and 15° at Agra. This very cool period lasted until the 26th, during which occasional showers continued to be received. With the cessation of rain the temperature began to rise steadily, and at the end of the month was again considerably above the normal. The excess averaged 7° in the Central Provinces; 5° in Bengal, Central India, Sind, Guzerat, and Rajputana; and 4° in the North-West Provinces and the Punjab. During this period of increasing temperature the area of highest temperature was transferred to Sind.

The following gives the highest temperatures registered during the month at selected stations in Northern India and the highest temperature registered during the same month in the previous 14 years for comparison:

Stations.	Highest Maximum Temperature.	Date.	Highest Maximum Temperature in month of May since 1875.	Year.
Toungoo	107·7	12th & 13th	106·5	1881
Thayetmyo	109·7	9th & 17th	109·5	1881
Jessore	114·3	11th	103·2	1885
Calcutta	101·9	3rd & 5th	105·3	1879
Burdwan	113·7	12th	110·7	1879 & 1885
Berhampore	113·2	12th	113·0	1876
Purneah	108·3	19th	109·7	1879
Patna	113·7	11th	112·4	1884
Gya	114·6	11th	116·0	1884
Benares	114·3	11th	117·3	1884
Allahabad	115·9	11th	117·2	1884
Jhansi	114·5	8th to 10th & 19th.	117·5	1888
Akola	113·5	19th & 31st	115·5	1881
Hoshangabad	115·5	9th	115.6	1883 & 1886
Nagpur	114·2	10th	117·7	1883

Pressure.—One of the most important effects of the prolonged heat of May is to intensify previously existing barometric or pressure anomalies and to develop new ones. The mean pressure of the month for the whole of India was ·031" above the normal.

The following gives the pressure anomalies or the variations of the mean pressure in each district relative to the general condition of excessive pressure as stated above:

Province.	Mean Pressure Variations.		
	May 1st to 15th.	May 16th to 31st	May.
Burmah	+·015	—·019	—·002
Bengal	—·036	—·001	—·019
Assam	—·041	—·007	—·024
Behar and Chutia Nagpur	—·052	—·002	—·027
North-West Provinces	—·029	+·012	—·009
Punjab	+ 023	+·024	+·024
Sind and Rajputana	+·022	+·006	+·014
Central India	+·019	+·011	+·015
Central Provinces	+·007	+·005	+·006
Madras	+·002	—·013	—·006
Bombay	+·002	—·010	—·004

The chief features as indicated by the above are:

(*a*) Slightly defective pressure in the south and west of the Peninsula.

(*b*) Increased pressure in Upper India, more especially in Rajputana and the Punjab and the adjacent districts of the North-West Provinces. This feature was very persistent throughout the month and was unaffected by the changes of weather during the month. It will hence probably modify to a considerable extent the northward extension of the south-west monsoon current in June.

(*c*) Slightly increased pressure, small in amount, and hence probably of little importance, in Central India and the Central Provinces.

(*d*) Very deficient pressure in Behar, Bengal, Assam, and Burmah. This deficiency was to a large extent produced by the excessive temperature which prevailed in these areas during a large part of the month. This feature was however not so persistent as the excessive pressure in Upper India. The deficiency was large in the first half of May in Bengal, Assam, and Behar, and during the second half of May in Burmah. It will hence probably influence the extension of the south-west monsoon current in June (in the manner stated in the forecast already published), but it is difficult to estimate to what extent.

The only other feature of importance in the pressure conditions of the month are the local depressions. These were in all cases small and in no case gave rise to stormy winds over large areas. The following gives a brief statement of these depressions:

(1) Depression in Central Burmah on the 8th and 9th. It caused moderate rain in South and Central Burmah, and filled up on the 10th.

(2) Depression in Behar on the 14th which accompanied a strong inrush of south-west winds across the Bengal Coast and gave moderate to heavy thundershowers over the greater part of Bengal on that day. It filled up on the morning of the 15th.

(3) Depression in Sind on the 17th, 18th and 19th. This was apparently due to hot weather conditions, and was shortly afterwards followed by the transfer of the area of minimum pressure to Sind and Upper India.

(4) Small depression off the Coromandel Coast on the 21st and 22nd. It gave some light showers on that Coast, and filled up on the 22nd.

(5) Depression of May 22nd to 26th. On the 22nd a small depression lay over the Central Provinces and another over the north of the Bay. The former disappeared on the 23rd, and the depression in the Bay developed slightly and moved westwards towards the coast districts and eastern districts of the Central Provinces. It was throughout a large but a very shallow depression. It determined more or less general rain over a large portion of Central and Northern India, which occurred chiefly as thundershowers in Bengal, the North-West Provinces, Rajputana, Central India, and the Central Provinces. The depression filled up on the 26th and 27th.

pression began to form off the South Malabar Coast on the 29th. It was at first apparently of small importance, but in the first week of June it advanced northwards along the Bombay Coast and developed into a cyclonic storm. Its history will be given in next month's report.

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Storms.—The previous paragraph has shown that there was no large cyclonic storm during the month. Duststorms and thunderstorms were unusually numerous in Northern India, and were in some cases very violent. The following were reported during the month: Severe duststorms at Gya and Nowgoing on the 4th; hailstorm at Belgaum on the 7th; violent duststorm at Jacobabad on the 7th; thunderstorm at Negapatam on the 12th, during which 4 inches of rain fell; violent duststorms at Karwar on the 14th; very severe thunderstorm with hail at Kishnaghar on the 19th; duststorm at Sirsa on the 28th; violent duststorm with rain at Indore on the 21st; violent duststorm with hail and rain at Mount Abu on the 22nd; severe duststorm at Sirsa on the 22nd; a very heavy thunderstorm preceded by winds of almost hurricane force lasting for half an hour at Neemuch on the 22nd; and a severe nor'-wester at False Point on the 29th when the wind velocity averaged 32 miles per hour for a short period.

Rainfall.—The rainfall of the month has been of a somewhat unusual character. Rain fell daily in Assam from the 1st to the 13th; occasional showers were also received during this period in East Bengal and Burmah (chiefly on the 8th and 9th). The Punjab obtained local showers on the 10th and 13th, but the amounts were small.

Rain fell in large amounts in Assam from the 14th to the 18th, and nearly the whole of Bengal received moderate to heavy rain from thundershowers during the same period. Berhampore in Bengal obtained 4½ inches during a thunderstorm on the evening of the 15th. Two feeble advances of moist winds into the south of the Peninsula occurred during this period. The first took place on the 14th and 15th, and the second on the 17th and 18th. As usual the largest rainfall amounts were received in Ceylon and on the Malabar Coast. A brief interval of dry hot weather preceded a period of showery weather extending from the 21st to the 26th over a large part of the country including Burmah, Bengal, the North-West Provinces, Central Provinces, Central India, and Rajputana. Numerous thundershowers occurred during this period over the greater part of Northern and Central India, the chief effect of which was to cool the air very considerably and give a welcome break in the intensely hot weather which prevailed during the greater part of the month.

Assam and Burmah received moderate rain on the 29th, 30th and 31st. Heavy rain fell on the 29th in South-West Ceylon, and on the 30th and 31st on the South Malabar Coast. Colombo received 3½ inches and Mangalore 2¼ inches on the 29th; Cochin 4 inches and Mangalore 2½ inches on the 30th, and Cochin 3¼ inches on the 31st. This burst of rain was the commencement of that advance of south-west winds and general rain along the West Coast which is usually considered as the setting in of the south-west monsoon.

The month was drier than usual over the greater part of India. This was more especially the case in Lower Burmah and Bengal, in which moderately heavy rain is usually received. The actual rainfall in Lower Burmah was only 3·93 inches, the normal being 8·99 inches. The actual average rainfall of Bengal was 3·3 inches and the normal 6 inches. Rajputana, Central India, Guzerat, and the northern districts of the Central Provinces received larger amounts than usual in May due to the unusual fall in the fourth week of the month. The amounts were however not large and the rainfall hence unimportant. The rainfall of the month was in moderate excess in Ceylon and considerably above the average in Assam which received an average of 19·4 inches or 4·8 inches above the normal. The variations in other districts were small and of no great importance.

The following table gives complete data and shows the actual average rainfall and the normal rainfall of the month of the twenty-one districts into which the country is divided, so far as it is indicated by the telegraphic reports of a few stations in each district :—

Districts.	No. of stations.	Normal average rainfall in May.	Actual average rainfall in May 1889.	Difference from the average in May 1889.
Punjab, West	7	1·31	1·54	+0·23
" East	4	1·59	1·29	—0·30
North-Western Provinces, Trans-Gangetic ..	7	1·22	0 88	—0·34
" " Cis-Gangetic ..	3	0·42	0·31	—0·11
Behar	2	1·79	1·45	—0·34
North Bengal	3	5·72	2 79	—2·93
Assam—Cachar	3	14·64	19 43	+4·79
Lower Bengal and Chutia Nagpur ..	8	6·38	3·87	—2·51
Orissa—North Circars	5	3·23	1·33	—1·90
Central Provinces, South	7	0·87	0·24	—0·63
Berar—Khandeish	2	0·65	0·51	—0·14
Rajputana, Central India, Saugor, and Nerbudda ..	9	0·61	1·23	+0·62
Sind—Cutch	3	0·07	0·74	+0·67
Guzerat	3	0 22	0·79	+0·57
Konkan	4	1·59	0·39	—1·20
Deccan—Hyderabad	5	1·34	1·56	+0·22
Malabar	5	8·01	6·30	—1·71
Mysore—Bellary	4	4·12	2·81	—1·31
Carnatic	6	2·56	1·92	—0·64
Lower Burma	7	8·99	3·93	—5·06
Ceylon	1	12·84	14·84	+2·00